Available online at www.sciencedirect.com
SCIENCE DIRECT®
ELSEVIER
Nuclear Instruments and Methods in Physics Research B 208 (2003) xiii–xvii
NIM B
Beam Interactions with Materials & Atoms
www.elsevier.com/locate/nimb

Contents

Editorial vii
Committees and Sponsors ix
Photo xi
Contents xiii

Review of the 5th IRaP Conference
R.L. Clough 1

1. Review lectures

Irradiation of organic and polymer films with low-energy electrons
L. Sanche 4
Swift ion effects in polymers: industrial applications
P. Apel 11
LIGA process – micromachining technique using synchrotron radiation lithography – and some industrial applications
Y. Hirata 21
Vacuum ultraviolet photochemistry of polymers
V. Skurat 27
VUV and IR spectroellipsometric studies of polymer surfaces
J.A. Woollam, C. Bungay, J. Hilfiker and T. Tiwald 35
Plasma surface modification of polymers for biomedical use
C. Oehr 40
Space environment effects on polymers in low earth orbit
E. Grossman and I. Gouzman 48
Small angle neutron scattering and transmission electron microscopy studies of interpenetrating polymer networks from thermoplastic elastomers
R.P. Burford, M.G. Markotsis and R.B. Knott 58

2. Industrial equipment and processing

Applications for radiation processing of materials
M.R. Cleland, L.A. Parks and S. Cheng 66
Medium and high-energy electron beam radiation processing equipment for commercial applications
M.R. Cleland and L.A. Parks 74
Developments in low energy electron beam machinery and processes
S.V. Nablo, J. Chrusciel, D.A. Cleghorn and I. Rangwalla 90
Factors influencing equipment selection in electron beam processing
J.W. Barnard 98
New electron beam facility for R&D and production at acsion industries
V.J. Lopata, J.W. Barnard, C.B. Saunders and T.M. Stepanik 102

doi:10.1016/S0168-583X(03)01438-1

The present situation of the irradiation application industry and irradiation facilities in Japan
K. Mizusawa and T. Baba 106
Radiochemical sterilization and its use for sutures
S.W. Shalaby, Y. Doyle, B.L. Anneaux, K.A. Carpenter and F.R. Schiretz 110

3. Low energy and swift heavy ion effects, ion track membranes

Track-etch templates designed for micro- and nanofabrication
E. Ferain and R. Legras 115
Irradiation effects in polymers by heavy ions: The distribution of the chemical structure transformation in polymers
Y. Hama, T. Oka, H. Kudoh, M. Sugimoto and T. Seguchi 123
Ion track membranes providing heat pipe surfaces with capillary structures
G.N. Akapiev, S.N. Dmitriev, B. Erler, V.V. Shirkova, A. Schulz and H. Pietsch 133
Observation of heavy-ion tracks in polyimide by means of high-resolution scanning electron microscopy
S. Abu Saleh and Y. Eyal 137
Ion transport through asymmetric nanopores prepared by ion track etching
Z. Siwy, P. Apel, D. Dobrev, R. Neumann, R. Spohr, C. Trautmann and K. Voss 143
Track core size estimation in CR-39 track detector using atomic force microscope and UV-visible spectrophotometer
T. Yamauchi, D. Mineyama, H. Nakai, K. Oda and N. Yasuda 149
Etching rate and structural modification of polymer films during low energy ion irradiation
V. Zaporojtchenko, J. Zekonyte, J. Erichsen and F. Faupel 155
Crosslinking of polymers in heavy ion tracks
H. Koizumi, M. Taguchi, Y. Kobayashi and T. Ichikawa 161
A method to determine the opening process for pores of latent ion tracks in polymer using electrolytic etching
V.R. Oganessian, V.V. Trofimov, J. Vetter, M. Danziger, B. Dörschel and D. Hermsdorf 166
Models of the hydrogen release from polymers under ion beam irradiation
J. Davenas and P. Thévenard 170
Investigations of SiO_x-polymer "interphases" by glancing angle RBS with Li^+ and Be^+ ions
G. Dennler, A. Houdayer, P. Raynaud, I. Séguy, Y. Ségui and M.R. Wertheimer 176
Changes in the chemical structure and the mechanical properties of single-site polyethylene induced by ion-beam irradiation
T. Oka, H. Kanbe, F. Yatagai and Y. Hama 181

4. Electron-, X- and gamma-ray irradiation

Radiation induced processes in the co-polymer, polyethylene–poly(vinyl alcohol)
B.H. Milosavljevic and J.K. Thomas 185
Interaction between reinforce carbon black and polymeric matrix for industrial applications
S. Baccaro, F. Cataldo, A. Cecilia, A. Cemmi, F. Padella and A. Santini 191
γ irradiation of poly(vinyl chloride) for medical applications
S. Baccaro, V. Brunella, A. Cecilia and L. Costa 195
NMR measurements of residual dipolar couplings for lifetime assessments in γ-irradiated silica-PDMS composite materials
R.S. Maxwell and B. Balazs 199

Measurements of free radicals over a period of 4.5 years in gamma-irradiated ultra-high molecular weight polyethylene
N. Naheed, M.S. Jahan and M. Ridley 204
Measuring the porosity of thin films by the electron stimulated desorption of metastable species
E. Vichnevetski, A.D. Bass and L. Sanche 210
The effect of radiosterilization on cytotoxicity of polyurethane film
N. Sheikh 215
Radiation processing of elastomer materials for medical uses
E. Grosu, M. Răpă, A. Tomescu, E. Nemeş, T. Zaharescu, S. Jipa, R. Setnescu and C. Vasile 220
Cross sections for low energy (1–12 eV) inelastic electron scattering from condensed thymine
P.L. Levesque, M. Michaud and L. Sanche 225
Surface modification of polytetrafluoroethylene by synchrotron radiation
Y. Sato, D. Yamaguchi, T. Katoh, S. Ikeda, Y. Aoki, A. Oshima, Y. Tabata and M. Washio 231
Study of natural ageing of polypropylene by X-ray photoelectron spectroscopy
S. Massey, D. Roy and A. Adnot 236
Enhancement and control of cross-linking of dimethylaminoethyl methacrylate irradiated at low dose rate in the presence of ethylene glycol dimethacrylate
C. Uzun, M. Hassnisaber, M. Şen and O. Güven 242
EB processing of braided carbon fibre composite profiles
B. Zsigmond, L. Halász and T. Czvikovszky 247
Characterization study of gamma-irradiated, high melt-strength polypropylene
A.B. Lugão, E.C.L. Cardoso, L.F.C.P. Lima, B. Hustzler and S. Tokumoto 252
Radiation vulcanization of natural rubber latex using 250 keV electron beam machine
H. Chirinos, F. Yoshii, K. Makuuchi and A. Lugao 256

5. Plasma, UV and laser treatments; surface and thin films

Processing considerations with plasma-based ion implantation of polymers: theoretical aspects, limitations, and experimental results
A. Lacoste and J. Pelletier 260
Surface modification of nanoparticles for radiation curable acrylate clear coatings
F. Bauer, H.-J. Gläsel, E. Hartmann, E. Bilz and R. Mehnert 267
Direct initiation of the photopolymerization of acrylates by short-wavelength excimer UV radiation
T. Scherzer, W. Knolle, S. Naumov and R. Mehnert 271
Surface modification of ethylene-co-tetrafluoroethylene copolymer (ETFE) by plasma
N. Inagaki 277
Plasma treatment of polymers for surface and adhesion improvement
D. Hegemann, H. Brunner and C. Oehr 281
Surface free energy and cell attachment onto ion-beam irradiated polymer surfaces
C. Satriano, S. Carnazza, S. Guglielmino and G. Marletta 287
VUV-induced nitriding of polymer surfaces: Comparison with plasma treatments in nitrogen
F. Truica-Marasescu, S. Guimond and M.R. Wertheimer 294
Modified polymeric materials for durability in the atomic oxygen space environment
R.L. Kiefer, R.A. Anderson, M.-H.Y. Kim and S.A. Thibeault 300
Radiation-cured polymeric nanocomposites of enhanced surface-mechanical properties
H.-J. Gläsel, F. Bauer, E. Hartmann, R. Mehnert, H. Möbus and V. Ptatschek 303
Influence of sample composition and processing parameters on the UV cure of clear coatings
C.S.B. Ruiz, L.D.B. Machado, J.E. Volponi and E.S. Pino 309
Excimer laser decomposition of silicone
L.D. Laude, C. Cochrane, Cl. Dicara, C. Dupas-Bruzek and K. Kolev 314

6. Radiation chemistry and reaction kinetics; crosslinking, hydrogels

Hydrogels of polysaccharide derivatives crosslinked with irradiation at paste-like condition
F. Yoshii, L. Zhao, R.A. Wach, N. Nagasawa, H. Mitomo and T. Kume 320
Nano-, micro- and macroscopic hydrogels synthesized by radiation technique
J.M. Rosiak, I. Janik, S. Kadlubowski, M. Kozicki, P. Kujawa, P. Stasica and P. Ulanski 325
Characterization methods for radiation crosslinked poly(vinyl methyl ether) hydrogels
T. Schmidt, C. Querner and K.-F. Arndt 331
Chemical bond scission induced by $^{1}H^{+}$, $^{16}O^{8+}$, and γ-rays in a cellulose nitrate detector (O-082)
R. Barillon and T. Yamauchi 336
Determination of non-volatile radiolytic compounds in ethylene co-vinyl alcohol
A. Kothapalli and G. Sadler 340
Very low temperature irradiation of aliphatic polymers: Role of radical migration on the creation of stable groups (O-127)
M. Mélot, Y. Ngono-Ravache and E. Balanzat 345
Real time in situ spectroscopic characterization of radiation induced cationic polymerization of glycidyl ethers
M. Mascioni, J.M. Sands and G.R. Palmese 353
The effect of different stabilizers on the thermostability of electron beam crosslinked polyethylene in hot water
S. Hassanpour and F. Khoylou 358
Sensitization of the radiation-induced chain oxidation of aromatic amines in polymer films (038)
O.V. Kolninov, V.V. Kolesnikova, A.P. Podsobljaev and I.P. Shelukhov 364
Modification of biodegradable polymers by radiation crosslinking technique with polyfunctional monomers
F. Yoshii, M. Suhartini, N. Nagasawa, H. Mitomo and T. Kume 370
Radiation crosslinking and scission parameters for poly(vinyl methyl ether) in aqueous solution
I. Janik, E. Kasprzak, A. Al-Zier and J.M. Rosiak 374
Radiation-induced phenomena in ethylene-co-tetrafluoroethylene polymer Temperature and LET effects
A. Oshima and M. Washio 380
Distonic dimer radical cation of 2,3-dihydrofuran: Quantum chemical calculations and low-temperature EPR results
S. Naumov, I. Janovský, W. Knolle and R. Mehnert 385
ESR investigations on irradiated polystyrene
M. Chipara, R. Benson, M.D. Chipara and J.R. Reyes 390
In vivo biocompatibility studies of poly(*n*-vinyl 2-pyrrolidone/itaconic acid) hydrogels synthesized by γ-rays
S. Özdemir, E. Özdemir, R. Tunca, R. Hazıroğlu, M. Şen, Ö. Kantoğlu and O. Güven 395
Polarographic determination of uranyl adsorption onto poly(acrylamide-g-ethylenediaminetetraacetic acid) hydrogels in the presence of cadmium and lead
R. İnam, T. Çaykara and Ö. Kantoğlu 400

7. Radiation-induced grafting and polymerization

Radiation-induced polymerization monitored in situ by time-resolved fluorescence of probe molecules in methyl methacrylate
M.S. Frahn, R.D. Abellon, L.H. Luthjens, M.J.W. Vermeulen and J.M. Warman 405
Radiation grafting of different monomers onto PP foils irradiated with a 25 MeV proton beam
R. Mazzei, D. Tadey, E. Smolko and C. Rocco 411
Oriented immobilization of proteins on grafted porous polymers
M.L. Carbajal, E.E. Smolko and M. Grasselli 416
Study on poly-electrolyte membrane of crosslinked PTFE by radiation-grafting
K. Sato, S. Ikeda, M. Iida, A. Oshima, Y. Tabata and M. Washio 424

PVDF multifilament yarns grafted with polystyrene induced by γ-irradition: Influence of the grafting parameters on the mechanical properties
P. Marmey, M.C. Porté and Ch. Baquey 429
Functionalisation of PAA radiation grafted PVDF
N. Betz, J. Begue, M. Goncalves, K. Gionnet, G. Déléris and A. Le Moël 434

8. Radiation-resistance, aging and degradation

Hot electron and partial-discharge induced ageing of polymers
C. Laurent and G. Teyssedre 442
Dose rate effects in radiation degradation of polymer-based cable materials
V. Plaček, B. Bartoníček, V. Hnát and B. Otáhal 448
Measurement of charge storage and leakage in polyimides
A.R. Frederickson, C.E. Benson and J.F. Bockman 454
Influence of the molecular modifications on the properties of EPDM elastomers under irradiation
J. Davenas, I. Stevenson, N. Celette, G. Vigier and L. David 461
Radiation depolymerization of chitosan to prepare oligomers
L. Hai, T. Bang Diep, N. Nagasawa, F. Yoshii and T. Kume 466
The damaging process in irradiated light guides and scintillating fibers
T. Zoufal, K. Wick and B. Bodmann 471
Effects of ageing of electrical insulators after exposure for 11 years in the large electron–positron collider at CERN
M. Tavlet 476
Effect of gamma irradiation conditions on the radiation-induced degradation of isobutylene–isoprene rubber
M. Şen, C. Uzun, Ö. Kantoğlu, S.M. Erdoğan, V. Deniz and O. Güven 480
Effects of the high doses of irradiation on the mechanical properties of PS/PP blends
C. Albano, J. Reyes, M.N. Ichazo, J. González and M. Rodríguez 485
Oxidative degradation of CR-39 track detector in the surface region during gamma-irradiation
T. Yamauchi, Y. Somaki, H. Nakai, K. Oda, T. Ikeda, H. Honda and S. Tagawa 489
LET effects of neutron irradiated plastic scintillators
B. Bodmann, S. Göb and U. Holm 495
Immediate and long-term effects of electron beam irradiation on nitrile-butadiene rubber
G. Lopitaux, X. Coqueret, F. Boursereau and G. Larnac 500

Author index 505